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DESIGN AND FABRICATION OF VEHICLE IGNITION CONTROL BY HELMET

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ABSTRACT

The proposed system is a simple telemetry system, which is activated by means of a pressure that is applied to the helmet's interior when the rider wears it. The technology used is wireless frequency and is absolutely same for long term usage. Once activated the transmitter sends a control signal to the receiver circuit and activates the motor and the gear box attached to the chassis move forward direction. Here we are not showing the vehicles gear applying system we showing that how the signal can be bypass and the gear box by using the low rpm and high torque hoe easily the mechanism can be driven. There is some time lag in wearing the helmet and switching on of the circuit (average experimental time= 1.57 seconds)

Keyword : - *Transmitter , Receiver , helmet and motor*

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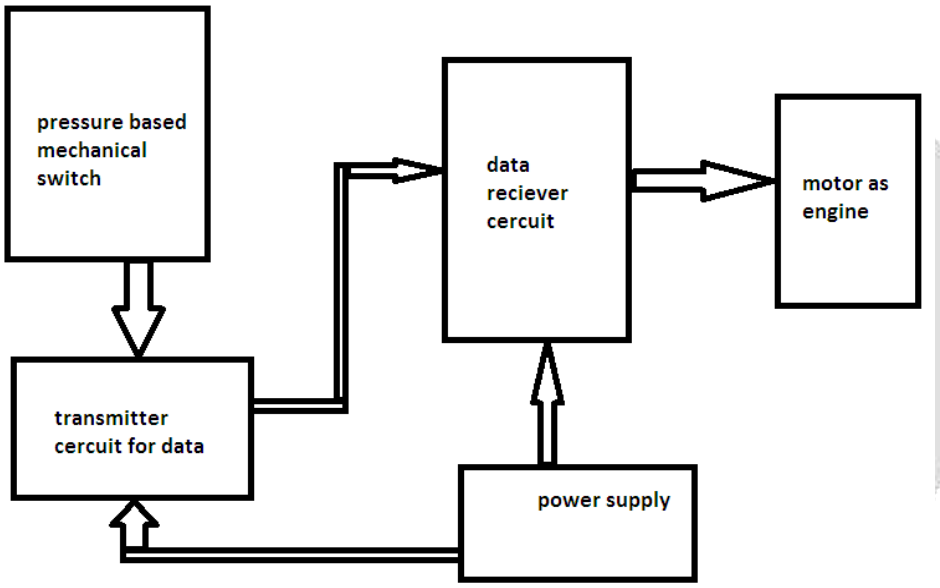
1. INTRODUCTION

ROAD traffic crashes take the lives of nearly 1.3 million every year and injure 20-50 million more in the world. Refusal to use proper motorcycle helmets is among the main factor contributing to deaths from road crashes – WHO said this in its report on 'Decade of Action for Road Safety 2011-2010'. More disturbingly, a large number of deaths from road accidents are borne by "vulnerable road users" such as pedestrians, cyclists and motorcyclists. Around 13% of the victims from road-related deaths are pedestrians in India as compared to 15% of accidents from passenger cars and taxis and 27% from riders of motorized two-or-three wheelers. So if it can be made mandatory to make the people wear the helmet when they ride the bike then the rates of these accidents can be expected to fall.

Worldwide most governments have already made stringent laws regarding wearing the helmet .But despite the laws such cases are still on a rise because of The lack of proper implementation. Most helmet innovations today focuses on only one thing, i.e, fancy features like adding a MP3 player or wireless phone or even a flash light on top of it. But none of these features give a guarantee that they are meant to be used for bike rider's safety.

2. WORKING OF BLOCK DIAGRAM



The pressure based mechanical switch will be attached on the helmet of the driver. When the helmet is weared by the driver the switch will be pressed and the transmitter circuit will generate a command and the data will be sent to the receiver module attached with the receiver circuit.

The motor will work as engine.

The data will be sent through the frequency and the frequency will define that is individual and will not match to any other vehicle Helmet. Engine will be on and off as per the helmet wearing status.

3.DESCRIPTION OF EACH COMPONENTS

3.1Transmitter circuit

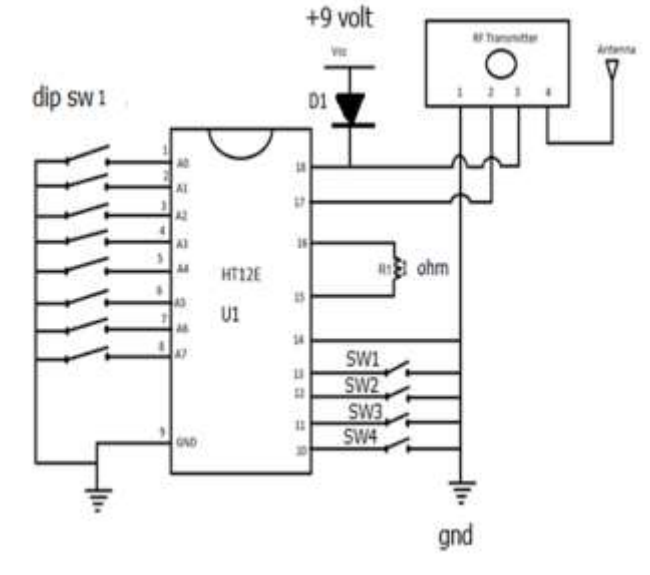


Fig. 2(b):- transmitter circuit

Parts list

Transmitter

Resistor

R1 -1mohm (1/4watt)

Semiconductors

D1 -1n4148

U1-ht12e

Sc1-18pin ic socket

Accessories

Snp1-9volt battery snapper

Sw1-sw4 4 pins connection to the voice recognition module

Dip sw1-8 way dip switch

From A0 to A7 the dip switch that the address setting switch between the transmitter and receiver will be connected. From pin no.13 to pin no.10 the connection will be connected to voice recognition module. This four connection will

give commands for forward, reverse, left; right.the d1 is the zener diode that will drop the voltage that will be supplied to the tx module. The input voltage will be 9 volt dc.that will supply from the battery.

Transmitter circuit is mounted on the helmet. The function of this circuit is to transmit the control signal of particular frequency to the receiver circuit. The working of this circuit is explained below one by one.

BATTERY : 9 V (200 mA.) this is non-rechargable battery. This battery supply power to each components mounted on the transmitter circuit.

CONNECTORS: this is used to simply connect the circuit to the battery.

Encoder IC: it decode the signal from pressure switch i.e, either it is ON command or OFF command.

And depending upon this it will transmit signal to transmitter module.

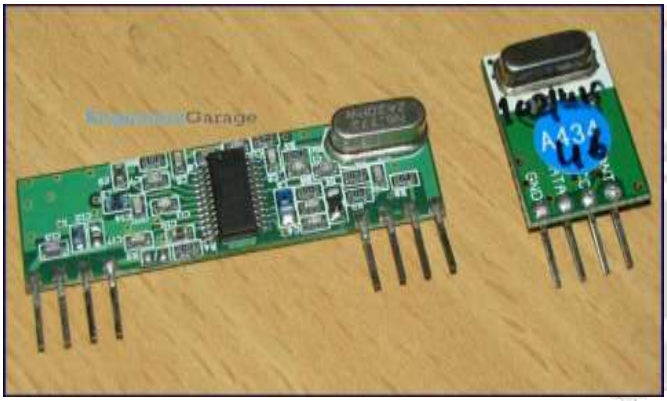
TRANSMITTER MODULE(433 MHz): it receives control signal from encoder IC and convert it into wireless signal and then this signal is transmitted to the receiver module through antenna

PAIRING SWITCHES : this switch is provided with 1 to 8 digit numbers which can be set by user and the serial number on this switch should match with the serial no. provided on the same switch on the receiver circuit.

ZENER DIODE: It lowers the voltage from 9V to 5V which is required by the all components on transmitter circuit.

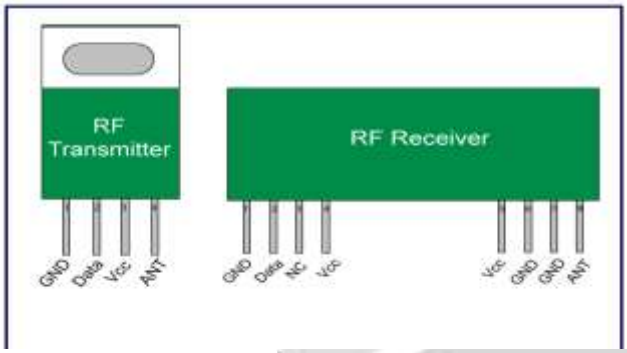
RESISTOR : to protect ic from heating and provide favorable voltage level.

RF Module (Transmitter & Receiver)



The RF module, as the name suggests, operates at Radio Frequency. The corresponding frequency range varies between 30 kHz & 300 GHz. In this RF system, the digital data is represented as variations in the amplitude of carrier wave. This kind of modulation is known as Amplitude Shift Keying (ASK). Transmission through RF is better than IR (infrared) because of many reasons. Firstly, signals through RF can travel through larger distances making it suitable for long range applications. Also, while IR mostly operates in line-of-sight mode, RF signals can travel even when there is an obstruction between transmitter & receiver. Next, RF transmission is more strong and reliable than IR transmission. RF communication uses a specific frequency unlike IR signals which are affected by other IR emitting sources. This **RF module** comprises of an **RF Transmitter** and an **RF Receiver**. The transmitter/receiver (Tx/Rx) pair operates at a frequency of **434 MHz**. An RF transmitter receives serial data and transmits it wirelessly through RF through its antenna connected at pin4. The transmission occurs at the rate of

1Kbps - 10Kbps.The transmitted data is received by an RF receiver operating at the same frequency as that of the transmitter. The RF module is often used alongwith a pair of encoder/decoder. The encoder is used for encoding parallel data for transmission feed while reception is decoded by a decoder. HT12E-HT12D, HT640-HT648, etc. are some commonly used encoder/decoder pair ICs.



Pin Description:

RF Transmitter

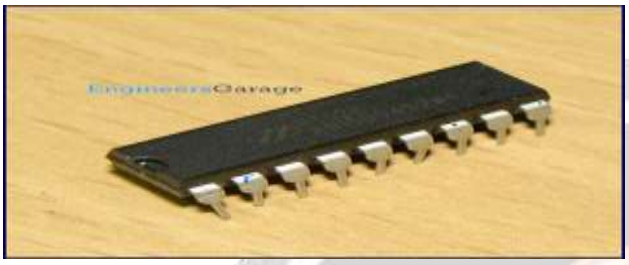
Pin No	**Function**	**Name**
1	Ground (0V)	Ground
2	Serial data input pin	Data
3	Supply voltage; 5V	Vcc
4	Antenna output pin	ANT

RF Receiver

Pin No	**Function**	**Name**
1	Ground (0V)	Ground
2	Serial data output pin	Data
3	Linear output pin; not connected	NC
4	Supply voltage; 5V	Vcc
5	Supply voltage; 5V	Vcc

6	Ground (0V)	Ground
7	Ground (0V)	Ground
8	Antenna input pin	ANT

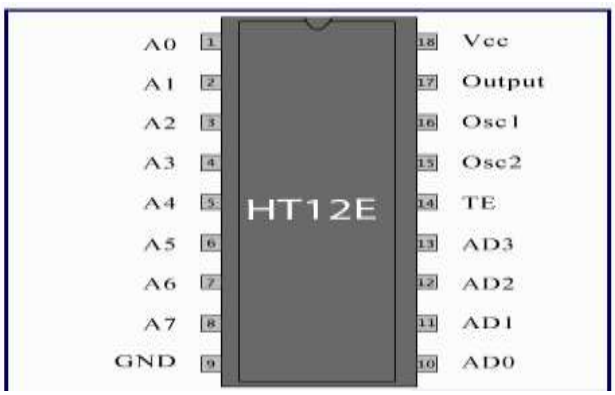
Encoder ic



HT12E is an **encoder integrated circuit** of 2^{12} series of encoders. They are paired with 2^{12} series of decoders for use in remote control system applications. It is mainly used in interfacing RF and infrared circuits.
The chosen pair of encoder/decoder should have same number of addresses and data format.

Simply put, HT12E converts the parallel inputs into serial output. It encodes the 12 bit parallel data into serial for transmission through an RF transmitter. These 12 bits are divided into 8 address bits and 4 data bits.

HT12E has a transmission enable pin which is active low. When a trigger signal is received on TE pin, the programmed addresses/data are transmitted together with the header bits via an RF or an infrared transmission medium. HT12E begins a 4-word transmission cycle upon receipt of a transmission enable. This cycle is repeated as long as TE is kept low. As soon as TE returns to high, the encoder output completes its final cycle and then stops.



Pin Description:

Pin No	Function	Name
1	8 bit Address pins for input	A0
2		A1

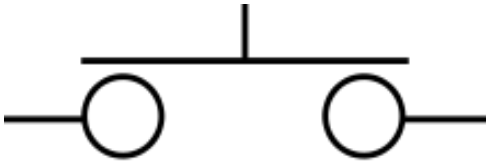
3		A2
4		A3
5		A4
6		A5
7		A6
8		A7
9	Ground (0V)	Ground
10	4 bit Data/Address pins for input	AD0
11		AD1
12		AD2
13		AD3
14	Transmission enable; active low	TE
15	Oscillator input	Osc2
16	Oscillator output	Osc1
17	Serial data output	Output
18	Supply voltage; 5V (2.4V-12V)	Vcc

DIP SWITCH

A **DIP switch** is a manual electric switch that is packaged with others in a group in a standard dual in-line package (DIP). The term may refer to each individual switch, or to the unit as a whole. This type of switch is designed to be used on a printed circuit board along with other electronic components and is commonly used to customize the behavior of an electronic device for specific situations. DIP switches are an alternative to jumper blocks. Their main advantages are that they are quicker to change and there are no parts to lose. The DIP

switch with sliding levers was granted US Patent 4012608 in 1976. It was applied for 1974 and was used in 1977 in an ATARI Flipper game.

PUSH SWITCH



A **push switch** is a momentary or non-latching switch which causes a temporary change in the state of an electrical circuit only while the switch is physically actuated. An automatic mechanism (i.e. a spring) returns the switch to its default position immediately afterwards, restoring the initial circuit condition.

RESISTOR

A **resistor** isa passive two-terminal electrical component that implements electrical resistance as a circuit element. Resistors act to reduce current flow, and, at the same time, act to lower voltage levels within circuits. In electronic circuits resistors are used to limit current flow, to adjust signal levels, bias active elements, terminatetransmission lines among other uses.

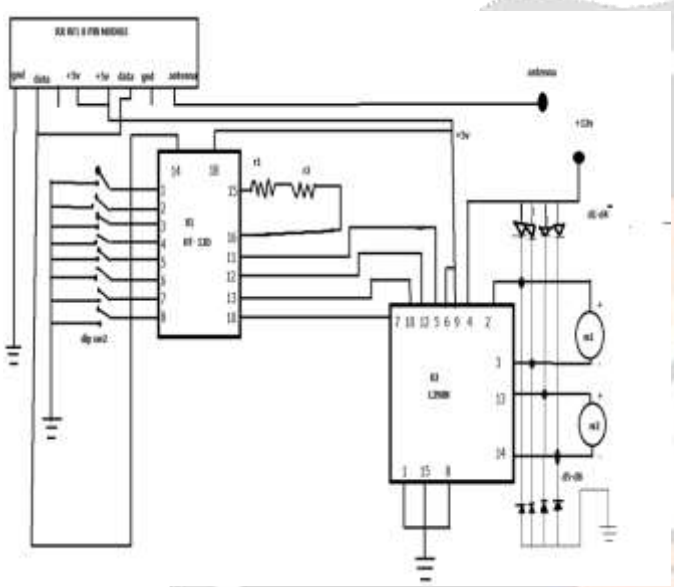
DIODE

In electronics, a **diode** is a two-terminal electronic component with asymmetric conductance; it has low (ideally zero) resistance to current in one direction, and high (ideallyinfinite) resistance in the other. A **semiconductor diode**, the most common type today, is a crystalline piece of semiconductor material with a p–n junction connected to two electrical terminals.

A vacuum tube diode has two electrodes, a plate (anode) and a heated cathode. Semiconductor diodes were the first semiconductor electronic devices. The discovery of crystals' rectifying abilities was made by German

physicist Ferdinand Braun in 1874. The first semiconductor diodes, called cat's whisker diodes, developed around 1906, were made of mineral crystals such as galena. Today, most diodes are made of silicon, but other semiconductors such as selenium or germanium are sometimes used.[6]

3.2 RECEIVER CIRCUIT



Parts list

Receiver

Resistors

R1-r2 - 1kohm

Capacitors

C1-100mfd/25v

C2-104(0.1uf)

C3 – 224(0.22uf)

Semiconductor

U1 ht-12d

Sc1-18 pin ic socket

U2- L298n

U3-7805

D1-D8 1N4007

ACCESSORIES

PBT1 /2/3 PBT2

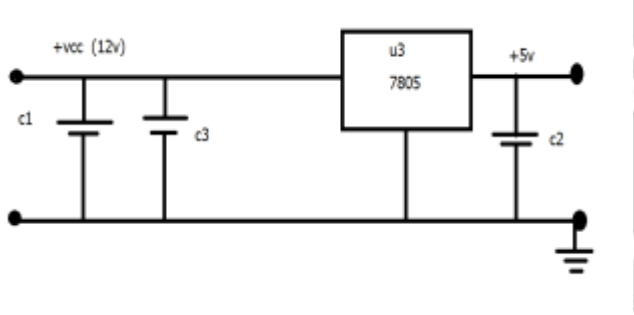
RX RF1 ASK RX MODULE

(3PIN OR 8PIN)

DIP SW2 8WAY DIP SWITCH

M1-M2 DC MOTOR

The input voltage will be 12 volt dc from the battery that will be supplied to the l298 motor driver ic.Through the 12 volt dc the 5 volt dc will be supplied to the rf receiver module. The capacitor will do the purification work the pure dc will be supplied to the module from the capacitor. he resistance at pin no. 15 and 16 is connected for oscillation purpose on ht12d ic. The forward and reverse motion of the two motors is controlled by the key pressed from the transmitter. The forward and the reverse motion to the motor is governed by the ic l298n.the pulses on the pin 5,7 decides the motion of the motor 1 and on pin 10,12 decides the forward and reverse motion of the motor 2. From d1 to d8 the diodes are connected on the m0otor terminal so that there will not be any reverse current or emf flow from the motor if this will happen the ic will get damaged.



RECEIVER MODULE : it receives signal from transmitter module
DECODER IC : it will decode received signal.
REGULATOR IC 7805 : receiver module is supplied with 12 volts by battery but engine driver ic and receiver module require 5 volt for their operation hence regulator ic step down 12 volt dc to 5 volt dc.
ELECTROLYTIC CAPACITOR :- this are used to allow only pure dc supply in the circuit, in other words it will remove any impurities present in the voltage.
CONNECTORS : these are used to connect the dc motor to receiver circuit.

PAIRING SWITCHES : just as in transmitter circuit, this switch is provided with 1 to 8 digit numbers which can be set by user and the serial number on this switch should match with the serial no. provided on the same switch on the transmitter circuit.

CERAMIC CAPACITOR : these are fixed value capacitors consisting no ON/OFF terminals in which the ceramic material act as dielectric.

RESISTORS : to protect decoder ic from heating and provide favorable voltage level.

ENGINE DRIVER IC : it will carry signal from decoder ic and supply to the motor and gear system to drive it. due to this the temperature of engine driver ic will start increasing hence the aluminum fins is provided known as heat sink.

8 DIODES : sometimes the magnetic flux produced in the motor are reversed and this will flow towards engine driver ic resulting in the damage to the engine driver ic to stop it diodes will block this reversed flux to protect ic from damaging.

CONNECTORS : these are used to connect the dc motor to Engine driver circuit.

ENGINE DRIVER IC : it will carry signal from decoder ic and supply to the motor and gear system to drive it. due to this the temperature of engine driver ic will start increasing hence the aluminum fins is provided known as heat sink.**8 DIODES** : sometimes the magnetic flux produced in the motor are reversed and this will flow towards engine driver ic resulting in the damage to the engine driver ic to stop it diodes will block this reversed flux to protect ic from damaging.

CONNECTORS : these are used to connect the dc motor to Engine driver circuit.

Decoder ic

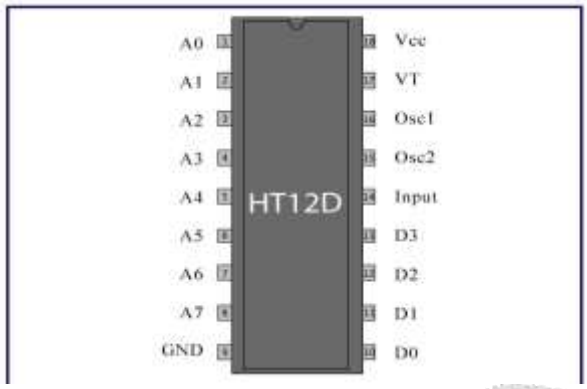
HT12D is a **decoder integrated circuit** that belongs to 2^{12} series of decoders. This series of decoders are mainly used for remote control system applications, like burglar alarm, car door controller, security system etc. It is mainly provided to interface RF and infrared circuits.

They are paired with 2^{12} series of encoders. The chosen pair of encoder/decoder should have same number of addresses and data format.

In simple terms, HT12D converts the serial input into parallel outputs. It decodes the serial addresses and data received by, say, an RF receiver, into parallel data and sends them to output data pins.

The serial input data is compared with the local addresses three times continuously. The input data code is decoded when no error or unmatched codes are found. A valid transmission in indicated by a high signal at VT pin.

HT12D is capable of decoding 12 bits, of which 8 are address bits and 4 are data bits. The data on 4 bit latch type output pins remain unchanged until new is received.



Pin Description:

Pin No	Function	Name
1	8 bit Address pins for input	A0
2		A1
3		A2
4		A3
5		A4
6		A5
7		A6
8		A7
9	Ground (0V)	Ground
10	4 bit Data/Address pins for output	D0
11		D1
12		D2
13		D3
14	Serial data input	Input
15	Oscillator output	Osc2
16	Oscillator input	Osc1
17	Valid transmission; active high	VT

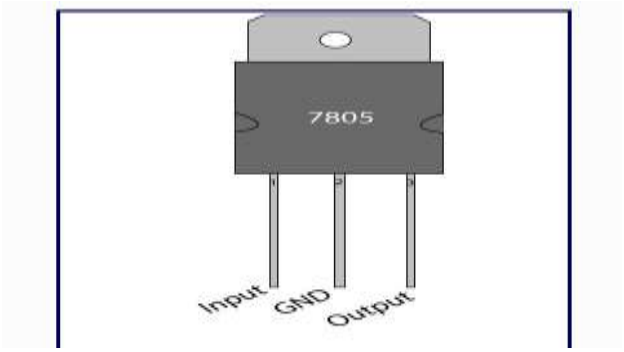
18	Supply voltage; 5V (2.4V-12V)	Vcc

RF Modules are used wireless transfer data and low cost application. This makes them suitable for remote control applications, as in where you need to control some machines or robots without getting in touch with them (may be due to various reasons like safety, etc).
Now depending upon the type of application, the RF module is chosen. For short range wireless control applications, an RF Transmitter-Receiver Module of frequency 315 MHz is the most suitable type. This RF modules are works with PT2262(encoder) and PT2272(decoder) as remote control.

Specification:

- Frequency: 315Mhz
- Modulation: ASK
- Transmitter input voltage: 3-12V
- Transmitter(RF-TX-315) and Receiver(RF-RX-315)
- *Range in open space(Standard Conditions) : 100 Meters*

REGULATOR IC



7805 is a **voltage regulator** integrated circuit. It is a member of 78xx series of fixed linear voltage regulator ICs. The voltage source in a circuit may have fluctuations and would not give the fixed voltage output. The **voltage regulator IC** maintains the output voltage at a constant value. The xx in 78xx indicates the fixed output voltage it is designed to provide. 7805 provides +5V regulated power supply. Capacitors of suitable values can be connected at input and output pins depending upon the respective voltage levels.

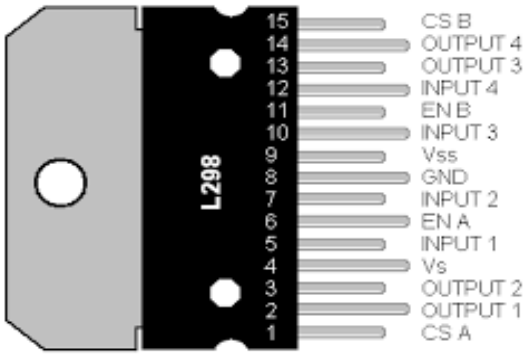
Pin Description:

Pin No	**Function**	**Name**
1	Input voltage (5V-18V)	Input
2	Ground (0V)	Ground
3	Regulated output; 5V (4.8V-5.2V)	Output

ELECTROLYTIC CAPACITOR

An **electrolytic capacitor** ("electrolytic") is a capacitor in which one electrode is made of a metal on which a thin oxide layer forms. This layer acts as the capacitor's dielectric. An electrolyte covers the surface of the oxide layer and also serves as the second electrode.Electrolytics have a capacitance to volume ratio much higher than to ceramic capacitors and film capacitors, but smaller than supercapacitors. They find extensive use in electronic devices. Their large capacitance makes electrolytics particularly suitable for passing or bypassing low-frequency signals and storing large amounts of energy. They may serve as filter and reservoir elements in power supplies, to couple signals between amplifier stages, or to store energy as in a flashlamp. Electrolytics can be made with aluminum, tantalum or niobium as the metal electrode and use various liquid (water based or solvent based) or solid electrolytes. Electrolytics store electric energy in an electric field in the dielectric oxide layer between the two electrodes. The cathode and the storage principle distinguish them from electrochemical supercapacitors, in which the electrolyte is the conductive connection between two electrodes and storage occurs via double-layer capacitance and pseudocapacitance. Electrolytics are polarized and operate with DC voltage. Reverse polarity, or excess ripple current can destroy the dielectric and thus the device. The destruction of electrolytics can produce an explosion and/or fire. Bipolar electrolytic capacitors, which may be operated with AC voltage, use two anodes c

L298 driver ic:



This dual bidirectional motor driver is based on the very popular L298 Dual H-Bridge Motor Driver IC. This module will allow you to easily and independently control two motors of up to 2A each in both directions.It is ideal for robotic applications and well suited for connection to a microcontroller requiring just a couple of control lines per motor.

In this tutorial you will learn how to use it with Arduino uno to control two dc motors.

Usage:

H-Bridge's are typically used in controlling motors speed and direction, but can be used for other projects such as driving the brightness of certain lighting projects such as high powered LED arrays.

How it works:

An H-Bridge is a circuit that can drive a current in either polarity and be controlled by *Pulse Width Modulation (PWM).

* Pulse Width Modulation is a means in controlling the duration of an electronic pulse. In motors try to imagine the brush as a water wheel and electrons as a the flowing droplets of water. The voltage would be the water flowing over the wheel at a constant rate, the more water flowing the higher the voltage. Motors are rated at certain voltages

and can be damaged if the voltage is applied to heavily or if it is dropped quickly to slow the motor down. Thus PWM. Take the water wheel analogy and think of the water hitting it in pulses but at a constant flow. The longer the pulses the faster the wheel will turn, the shorter the pulses, the slower the water wheel will turn. Motors will last much longer and be more reliable if controlled through PWM.

Pins:

- Out 1: Motor A lead out
- Out 2: Motor A lead out
- Out 3: Motor B lead out
- Out 4: Mo (*Can actually be from 5v-35v, just marked as 12v*)
- GND: Ground
- 5v: 5v input (*unnecessary if your power source is 7v-35v, if the power source is 7v-35v then it can act as a 5v out*)
- EnA: Enables PWM signal for Motor A (Please see the "Arduino Sketch Considerations" section)
- In1: Enable Motor A
- In2: Enable Motor A
- In3: Enable Motor B
- In4: Enable Motor B
- EnB: Enables PWM signal for Motor B (Please see the "Arduino Sketch Considerations" section)

Specifications:

- Double H bridge Drive Chip: *L298N*
- Logical voltage: *5V Drive voltage: 5V-35V*
- Logical current: *0-36mA Drive current: 2A (MAX single bridge)*
- Max power: *25W*
- Dimensions: *43 x 43 x 26mm*
- Weight: *26g*

3. CONCLUSIONS

The system was designed for person of same vehicle. repeated test was conducted for helmet where sensor detects the presence of helmet and ignition system turns on but in case without wearing helmet or helmet is been removed after engine starts, the control module automatically disengaging the ignition system thus leads the engine to stop, the total cost of system is 15000, so this can be implemented in as retrofitted in commercially available vehicles. Thus it can be concluded that engine on off system when incorporated into the conventional system will effectively increase the safety of the driver and also the vehicle safty.

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